

---

## D-channel diagnostic (LD 96)

---

The D-channel diagnostic program is used to test and maintain D-channel links and the QPC757 or NT6D11AB D-channel Interface (DCHI) card.

With X11 release 18, D-channels can also reside on Meridian Serial Data Link (MSDL) cards. A new set of LD 96 commands are provided to support MSDL cards.

### Monitoring

D-channel message monitoring is used to analyze the Layer 3 protocol messages traveling between the near and far end D-channels.

Up to and including X11 release 16, message monitoring can be performed only on a per D-channel basis using LD 96. That is, once the message monitor is turned on, all messages are output for that D-channel. The messages output might be excessive.

X11 release 17 provided additional commands in LD 96 that allows selective message monitoring based on the following:

- the D-channel
- the B- or ISL channel
- the message types for a specific feature
- any specific message

The following sections describe the various command formats.

**Note 1:** During high traffic some of the monitored messages may be lost.

**Note 2:** To get the D-channel monitor messages to display, the system terminal must have LD 17 prompt USER defined as MTC (X11 release 17).

## D-channels

All message types, features, and channels associated with a particular D-channel can be monitored. Up to and including X11 release 16, only one D-channel can be monitored for outgoing messages and one for incoming messages. X11 release 17 allows the monitoring of multiple D-channels for both incoming and outgoing messages.

The LD 96 commands to enable or disable monitoring of all incoming or outgoing messages on a D-channel are listed here:

ENL MSGI x—enable monitoring of incoming messages  
ENL MSGO x—enable monitoring of outgoing messages  
DIS MSGI x—disable monitoring of incoming messages  
DIS MSGO x—disable monitoring of outgoing messages

Where x is the DCHI or MSDL port address (I/O address). For example, to enable monitoring of incoming messages on D-channel 5, enter this command:

**ENL MSGI 5**

The output includes all messages, features, and channels for D-channel 5.

All monitor commands in LD 96 require a primary D-channel to be defined. If a backup D-channel number is entered for monitor definitions, an error is given and the command is aborted. Once the monitoring options are configured for the primary D-channel, they apply to the backup as well. For example, if a D-channel switchover takes place, and the backup becomes active, the monitor option set for the primary is effective for the backup.

## **B-channels and ISL channels**

You can monitor up to 5 ISL or B-channels for each direction. If there is no specific channel selected, all channels are monitored. The commands are listed below:

For B-channels:

ENL MSGI x CH loop channel  
ENL MSGO x CH loop channel  
DIS MSGI x CH loop channel  
DIS MSGO x CH loop channel

For ISL channels:

ENL MSGI x CH l s c u  
ENL MSGO x CH l s c u  
DIS MSGI x CH l s c u  
DIS MSGO x CH l s c u

Where

ENL = enable monitoring  
DIS = disable monitoring  
MSGI = incoming messages  
MSGO = outgoing messages

## ISDN features

You can select specific ISDN applications, such as Network Ring Again, for message monitoring. Only one or all ISDN applications can be monitored per D-channel at one time. The LD 96 commands are listed below, where x is the D-channel (DCHI or MSDL) port number:

- ENL MSGI x FEAT feature
- ENL MSGO x FEAT feature
- DIS MSGI x FEAT feature
- DIS MSGO x FEAT feature

Where “feature” can be

- NCT = Network Call Trace
- NRAG = Network Ring Again
- NACD = Network Automatic Call Distribution
- TRO = Trunk Optimization
- NMS = Network Message Services
- CPNW = Call Pickup Network Wide
- NITC = Network Intercom

## Message types

You can select specific types of messages to be monitored on a D-channel. The LD 96 commands are listed below, where x is the D-channel (DCHI or MSDL) port number.

```
ENL MSGI x MSG msg1 msg2 msg3
ENL MSGO x MSG msg1 msg2 msg3
DIS MSGI x MSG msg1 msg2 msg3
DIS MSGO x MSG msg1 msg2 msg3
```

Up to three message types (msg1, msg2, msg3) can be entered per command. The default is "ALL," which is all message types except SVC and SVCA. The message types are as follows:

```
ALER = alerting
ALL = all primitives and all messages except SVC and SVCA
CAPR = call proceeding
CON = connect
CONA = connect ack
DISC = disconnect
FAC = facility
FACA = facility ack
FACR = facility reject
INFO = information
NOTF = notify
PRIM = all primitives (such as release indication)
PROC = call proceeding
PROG = progress
RLS = release
RLSC = release complete
RST = restart
RSTA = restart ack
STAT = status
STEN = status enquiry
STP = setup
STPA = setup ack
SVC = service
SVCA = service ack
UI = user information
```

## Setting output format levels

There are three levels (0-2) of message decoding. The level determines the format of the data output to the system terminal. To set the output level enter the following:

```
SET MSGI x MON (0)-2
SET MSGO x MON (0)-2
```

Level 0 outputs the message as shown below:

```
DCH x y MSG msgtype REF xxxxxxxx CH zzzz TOD hh:mm:ss
<more data>
```

Where,

x = D-channel number  
y = "I" for incoming messages, "O" for outgoing messages  
xxxxxxx = the call reference number  
zzzz = the loop and channel number (or TN for ISL channels)  
<more data> = additional lines of information, such as  
CALLED # = called number  
CALLING # = calling number of originator  
CAUSE = reason for action taken (for example, unassigned number)  
CONNECT # = connected number  
FEAT = feature (such as Network Ring Again)  
NUM PLAN = Numbering plan used (such as private)  
PROGRESS = call progress description  
REDIR REASON = reason the call was re-directed  
REDN # = call redirection number  
STATE = call state  
STATUS = channel status  
TYPE = type of channel

Level 1 outputs the raw data (as was done in X11 release 16). The format is as follows:

```
DCH x y MSG msgtype REF xxxxxxxx TN zzzzzz CH# x CK x
<more data in hexadecimal>
```

Level 2 output identifies the individual Information Elements (IE) in the messages and their hexadecimal values.

BCAP = bearer capability  
CAST = call state  
CHGA = charge advice  
CHID = channel ID  
CHST = change status  
CLED = called number  
CLES = called party subaddress  
CLNG = calling number  
CLNS = calling party subaddress  
CNS5 = codeset 5 connected number subaddress  
CON# = connect number  
CON5 = codeset 5 connected number  
CSE = cause  
DES6 = codeset 6 Destination IE  
DISP = display  
FAC = facility IE for codeset 0  
FAC6 = codeset 6 facility IE  
FIND = feature Indication  
HLYR = higher layer compatibility  
INFO = information request  
KYPD = keypad  
LLYR = low layer compatibility  
LS5 = locking Shift to codeset 5  
LS6 = locking shift to codeset 6  
LS7 = locking Shift to codeset 7  
NLS5 = codeset 5 non-locking shift  
NLS6 = codeset 6 non-locking shift  
NLSO = non-locking shift to codeset 0  
NOTI = notify indicator  
NSF = network specific facility  
ORG# = originating called number  
ORG6 = codeset 6 Originating IE  
PROG = progress indicator  
RDG6 = codeset 6 redirecting number

REDG = redirecting number  
REDN = redirection number  
RETR = codeset 6 reason for return  
RSTI = restart indicator  
SHFT = shift  
SIGN = signal  
TACG = codeset 6 TTC advice charge  
TNS = transit network selection  
UNKN = unknown  
UUI = user-user information

## Deactivate monitor from a maintenance telephone

Once the system has been tied up or flooded with the monitored messages, it is very difficult, if not impossible, to use LD 96 to disable the monitors. In this case, a maintenance telephone with MTA class of service can be used to deactivate the monitor.

To activate or deactivate the monitor from a maintenance telephone, simply dial the following:

SPRE 9913 x 01

Where,

SPRE = special function access code (defined in LD 15)  
9913 = feature code to activate or deactivate the monitor  
x = 0 to deactivate, 1 to activate  
01 = DCH monitor ID

**Note 1:** Dial tone is provided if successful.

**Note 2:** Use RST MON to reactivate the monitor from LD 96.

**Note 3:** Deactivating the monitor by the maintenance telephone does not disable the monitor, but simply halts the output. If the monitor is deactivated and not disabled using the DIS MSGI and DIS MSGO commands, then the monitor becomes re-activated after a data dump and sysload.



## Get monitor status

To determine the current status of the D-channel monitor, enter the following command, where x is the D-channel (DCHI or MSDL) port number:

STAT MON x

Output format:

\*\*\*DCH MSGI x LEVEL y ACTV (where, y = format level)

MSG - msg1 msg2...

FEAT - feat

CH - loop channel (or l s c u for ISL)

\*\*\*DCH MSGO x LEVEL y ACTV

MSG - msg1 msg2...

FEAT - feat

CH - loop channel (or l s c u for ISL)

**Note:** If the monitor has been deactivated by the maintenance telephone, INACTV is output instead of ACTV.

## D-channel command summary

The following commands are used to enable, disable, test and get the status of a D-channel. Refer to the LD 96 introduction for details on the use of these commands.

In X11 release 18 all commands use DCH instead of DCHI. For example, use ENL DCH x instead of ENL DCHI x. The STAT DCH and STAT DCHI commands have been combined to STAT DCH.

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| DIS AUTO x           | Disable automatic recovery for DCH x.                                           |
| DIS DCH x            | Disable DCH x.                                                                  |
| DIS MSGI x (options) | Disable the monitoring of incoming messages on D-channel x.                     |
| DIS MSGO x (options) | Disable the monitoring of outgoing messages on D-channel x.                     |
| DIS SERV x           | Disable service messages on D-channel x.                                        |
| DWNL DCH x (t)       | Down load layer 3 message configuration table t and LAPD parameters from DCH x. |
| ENL AUTO x           | Enable automatic recovery for DCH x.                                            |
| ENL DCH x            | Enable DCH x and attempt to establish the link.                                 |
| ENL MSGI x (options) | Enable the monitoring of incoming messages on D-channel x.                      |
| ENL MSGO x (options) | Enable the monitoring of outgoing messages on D-channel x.                      |
| ENL SERV x           | Enable service messages on D-channel x.                                         |
| EST DCH x            | Establish multiple frame operation on D-channel x.                              |
| MAP DCH x            | Get physical address and switch settings for D-channels.                        |
| PLOG DCH x           | Print protocol error log on DCH x.                                              |
| PTAB DCH x (t)       | Display layer 3 message configuration table t and LAPD parameters from DCH x.   |
| RLS DCH x            | Release D-channel x.                                                            |
| RST DCH x            | Reset D-channel x, inhibit signaling.                                           |
| RST MON              | Reactivate monitoring on D-channels.                                            |
| SDCH DCH x           | Switch to the standby D-channel x.                                              |
| STAT DCH (x)         | Get status of one or all D-channels.                                            |
| STAT MON (x)         | Display the incoming and outgoing monitoring status of one or all D-channel.    |

---

|               |                                                                |
|---------------|----------------------------------------------------------------|
| STAT SERV (x) | Get the status of services messages for one or all D-channels. |
| TEST 100 x    | Perform interrupt generation test on DCH x.                    |
| TEST 101 x    | Perform loopback mode test on DCH x.                           |
| TEST 200 x    | Perform interrupt handler test on DCH x.                       |
| TEST 201 x    | Test interrupt handler-to-link interface path.                 |

## Multi-purpose Serial Data Link (MSDL) commands

The NT6D80 MSDL card provides 4 ports for ISDN Primary Rate D-channel (DCH) and Application Module Link (AML).

The MSDL commands are listed below, where x is the MSDL device number (defined by prompt DNUM in LD 17). These are provided in Link Diagnostic (LD 48) and D-channel Maintenance (LD 96) and I/O Diagnostic (LD 37).

- DIS MSDL x (ALL)—Disable MSDL card.
- ENL MSDL x (FDL, ALL)—Enable MSDL card.
- RST MSDL x—Reset MSDL card.
- STAT MSDL [x (FULL)]—Get MSDL status.
- SLFT MSDL x—Execute a self-test on MSDL card x.

These commands are provided in Link Diagnostic (LD 48) and D-channel Maintenance (LD 96), and I/O Diagnostic (LD 37). See *X11 input/output guide* (553-3001-400) for a complete description of these commands.

## MSDL D-channel command summary

The following commands are available only for D-channels on MSDL ports:

- |           |                                             |
|-----------|---------------------------------------------|
| DIS LLB x | Disable local loopback mode on MSDL DCH x.  |
| DIS RLB x | Disable remote loopback mode on MSDL DCH x. |

|            |                                                          |
|------------|----------------------------------------------------------|
| DIS TEST x | Disable TEST mode on MSDL DCH x.                         |
| ENL LLB x  | Enable local loopback mode on MSDL DCH x.                |
| ENL RLB x  | Enable remote loopback mode on MSDL DCH x.               |
| ENL TEST x | Enable TEST mode on MSDL DCH x.                          |
| MAP DCH x  | Get physical address and switch settings for D-channels. |
| PCON DCH x | Print configuration parameters on MSDL DCH x.            |
| PMES DCH x | Print incoming layer 3 messages on MSDL DCH x.           |
| PTRF DCH x | Print traffic report on MSDL DCH x.                      |
| TEST LLB x | Start local loopback test on MSDL DCH x.                 |
| TEST RLB x | Start remote loopback test on MSDL DCH x.                |

## Alphabetical list of commands

The following is an alphabetical list and brief description of all the commands found in LD 96. For complete discussions refer to *X11 input/output guide* (553-3001-400).

|                      |                                                                                                                                                                                                  |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DIS AUTO x           | Disable automatic recovery for DCH x.                                                                                                                                                            |
| DIS DCH x            | Disable DCH x. (X11 release 17 and earlier uses the following command format: ENL DCHI x.)                                                                                                       |
| DIS LLB x            | Disable local loopback mode on MSDL DCH x.                                                                                                                                                       |
| DIS MSGI x (options) | Disable the monitoring of incoming messages on D-channel x.                                                                                                                                      |
| DIS MSGO x (options) | Disable the monitoring of outgoing messages on D-channel x.                                                                                                                                      |
| DIS RLB x            | Disable remote loopback mode on MSDL DCH x.                                                                                                                                                      |
| DIS SERV x           | Disable service messages on D-channel x.                                                                                                                                                         |
| DIS TEST x           | Disable TEST mode on MSDL DCH x.                                                                                                                                                                 |
| ENL AUTO x           | Enable automatic recovery for DCH x.                                                                                                                                                             |
| ENL DCH x (FDL)      | Enable DCH x and attempt to establish the link. FDL (optional) and force downloads D-channel loadware to MSDL card.<br>X11 release 17 and earlier uses the following command format: ENL DCHI x. |
| ENL LLB x            | Enable local loopback mode on MSDL DCH x.                                                                                                                                                        |
| ENL MSGI x (options) | Enable the monitoring of incoming messages on D-channel x.                                                                                                                                       |

---

|                      |                                                                                                                                 |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------|
| ENL MSGO x (options) | Enable the monitoring of outgoing messages on D-channel x.                                                                      |
| ENL RLB x            | Enable remote loopback mode on MSDL DCH x.                                                                                      |
| ENL SERV x           | Enable service messages on D-channel x.                                                                                         |
| ENL TEST x           | Enable TEST mode on MSDL DCH x.                                                                                                 |
| EST DCH x            | Establish multiple frame operation on D-channel x.<br>X11 release 17 and earlier uses the following command format: EST DCHI x. |
| MAP DCH (x)          | Get physical address and switch settings for D-channels.                                                                        |
| PCON DCH x           | Print configuration parameters on MSDL DCH x.                                                                                   |
| PLOG DCH x           | Print protocol error log on DCH x.<br>X11 release 17 and earlier uses the following command format: PLOG DCHI x.                |
| PMES DCH x           | Print incoming layer 3 messages on MSDL DCH x.                                                                                  |
| PTRF DCH x           | Print traffic report on MSDL DCH x.                                                                                             |
| RLS DCH x            | Release D-channel x.<br>X11 release 17 and earlier uses the following command format: RLS DCHI x.                               |
| RST DCH x            | Reset D-channel x, inhibit signaling.<br>X11 release 17 and earlier uses the following command format: RST DCHI x.              |
| RST MON              | Reset or reactivate monitoring on D-channels with enabled monitors.                                                             |
| SDCH DCH x           | Switch to the standby D-channel x.<br>X11 release 17 and earlier uses the following command format: SDCH DCHI x.                |
| SET MSGI x MON (0)-2 | Set monitor output format level for incoming messages.                                                                          |

|                      |                                                                                                     |
|----------------------|-----------------------------------------------------------------------------------------------------|
| SET MSGO x MON (0)-2 | Set monitor output format level for outgoing messages.                                              |
| STAT DCH (x)         | Get status of one or all D-channels.<br>X11 release 17 and earlier uses STAT DCHI to get the status |
| STAT MON (x)         | Display the monitoring status of one or all D-channels.                                             |
| STAT SERV (x)        | Get the status of services messages for one or all D-channels.                                      |
| TEST 100 x           | Perform interrupt generation test on DCH x.                                                         |
| TEST 101 x           | Perform loopback mode test on DCH x.                                                                |
| TEST 200 x           | Perform interrupt handler test on DCH x.                                                            |
| TEST 201 x           | Test interrupt handler-to-link interface path.                                                      |
| TEST LLB x           | Start local loopback test on MSDL DCH x.                                                            |
| TEST RLB x           | Start remote loopback test on MSDL DCH x.                                                           |